

Written Reply

To Mr. Junya GOTO, Examiner at the Patent Office

1. Identification of the International Application

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5. Contents of this Argument

- (1) The Examiner considers that claims 1 to 7 of the present application lack an inventive step.

In view of the Examiner's consideration, the Applicant filed a Written Amendment to amend the claims in the present application on the same date of this Written Reply. We believe that this amendment will lead to an acknowledgment that the present invention has an inventive step.

(2) Contents of the amendment in the Written Amendment are mainly as follows.

(i) Claim 1 is amended so as to clarify that the ultrasonic element unit includes a rotating mechanism portion that is a spontaneous rotation type motor whose rotation is induced magnetically.

This amendment is based on the description on page 4, lines 11 to 13 (page 4, lines 19 to 22 of the English translation) of the present specification.

(ii) Claim 8 is added. The limitation of this claim is based on the description on page 6, lines 4 to 14 (page 6, lines 12 to 24 of the English translation) of the present specification.

(3) Novelty and inventive step of the present invention

(i) Description of the present invention

As described in the Written Amendment, the invention according to claim 1 of the present application relates to

“an ultrasonic probe, comprising: an ultrasonic element unit for transmitting and receiving an ultrasonic wave while carrying out ultrasonic scanning; a storage portion for storing the ultrasonic element unit; and an acoustic medium liquid charged in the storage portion,

wherein the ultrasonic element unit includes a rotating mechanism portion stored in the storage portion, the rotating mechanism portion being a spontaneous rotation type motor whose rotation is induced magnetically and being supported by an elastic supporting member, and

the storage portion is sealed by the supporting member in a liquid-tight state.”

According to the present invention, the ultrasonic element unit is supported by the elastic supporting member in the storage portion.

Therefore, even when an external shock is applied, the supporting member

absorbs the shock so as to relieve stress to be applied to the ultrasonic element unit. In particular, according to the present invention, the rotating mechanism portion as the motor is arranged in the sealed storage portion and is supported by the elastic member. Therefore, it is possible to relieve not only stress to be applied to an ultrasonic wave transmitting/receiving mechanism portion that constitutes the ultrasonic element unit but also stress to be applied to the rotating mechanism portion for rotating the same.

Further, the supporting member also serves as a sealing member for sealing the storage portion in a liquid-tight state with its elasticity. Therefore, with the sealing function of the supporting member, even when an external shock is applied, it is possible to suppress the liquid-tight state in the storage portion from being broken, followed by the entry of air bubbles.

(ii) Description of cited documents

Document 1 (JP 8-112280 A) discloses an ultrasonic probe including an oscillator portion assembly arranged in a storage portion, the oscillator portion assembly including an oscillator and an oscillator holder. In this probe, the oscillator portion assembly is connected with a flexible shaft, so that a rotating torque from a driving portion (motor) provided outside of the storage portion is transmitted to the oscillator portion assembly via the flexible shaft, thereby rotating the oscillator portion assembly (paragraph [0013], Figure 7, etc.). As described above, the rotating mechanism portion (motor) for rotating the oscillator is arranged outside of the storage portion.

Document 2 (JP 62-167543 A) discloses an ultrasonic probe including an oscillator and a movement converting mechanism arranged in a storage portion. In this probe, an electric motor for rotating the oscillator is arranged outside of the storage portion (Figure 3).

Document 3 (JP 58-165833 A) discloses an ultrasonic probe, but does

not refer to the rotating mechanism portion for rotating an oscillator. However, it is assumed from Figures 1 and 2 that a motor for rotating the oscillator is arranged outside of a storage portion also in this probe.

(iii) Comparison between the present invention and the inventions of the cited documents

As described above, Documents 1 to 3 describe the inventions in which the rotating mechanism portion is arranged outside of the storage portion, and does not describe or suggest the configuration in which the rotating mechanism portion is arranged in the storage portion as in the present invention. Further, there is neither description nor suggestion that the rotating mechanism portion is supported by the elastic supporting member.

As described above, the above documents neither describe nor suggest the configuration of the present invention. The present invention provides a particular configuration that is obviously different from that of the invention in each of the above documents, i.e., the configuration in which the rotating mechanism portion as the spontaneous rotation type motor is arranged in the storage portion and is supported by the elastic supporting member. With this particular configuration, even when an external shock is applied, it is possible to relieve not only stress to be applied to the ultrasonic wave transmitting/receiving mechanism portion that constitutes the ultrasonic element unit but also stress to be applied to the rotating mechanism portion for rotating the same. Further, with the sealing function of the supporting member, the present invention can achieve a special effect that cannot be achieved by the invention described in each of the above documents, i.e., the effect of suppressing the entry of air bubbles that occurs when the liquid-tight state in the storage portion is broken.

Therefore, we believe that the present invention is not obvious from

the above documents and involves in an inventive step.

(4) The inventions according to claims 2 to 7 restrict the invention according to claim 1 further. Since the invention according to claim 1 has an inventive step over the above documents as described above, claims 2 to 7 would also have an inventive step.

(5) As described above, we believe that the present invention has an inventive step. We respectfully hope for the Examiner to consider that the present invention involves in an inventive step after due reexamination of the present application.

6. List of appended documents

(1) Written Amendment 1 set